Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for automatically teaching a reference position which is ~~the reference of the~~ a reference of a position of a disc-like object in ~~the reference~~ a reference co-ordinate system including ~~the position~~ a position of a handling device to ~~the handling~~ a handling device of the ~~fore-mentioned~~ disc-like object, ~~comprising~~ the disc-like object having no substantial concave or convex portions along a peripheral rim, the method comprising:

a step of determining ~~the center~~ a center position of a disc-like object with a known radius which was situated at a fixed place being the reference position in the ~~fore-mentioned~~ reference co-ordinate ~~system and~~ system; and

a step of memorizing the position of the ~~fore-mentioned~~ fixed place in the ~~fore-mentioned~~ reference co-ordinate system which was determined by calculation based on the ~~fore-mentioned~~ center position in the ~~fore-mentioned~~ handling device as the reference position,

wherein the step of determining the center position of the ~~fore-mentioned~~ disc-like object ~~comprises~~ comprises:

a step of relatively moving a detection means against the ~~fore-mentioned~~ disc-like object and making one locus of the ~~fore-mentioned~~ detection means cross ~~against the~~ against a circumference of the ~~fore-mentioned~~ disc-like object,

a step of determining ~~the position~~ positions of two intersections by the ~~fore-mentioned~~ crossing in the ~~fore-mentioned~~ reference co-ordinate system, and

a step of calculating the ~~fore-mentioned~~ center position ~~using the~~ using a specific point on ~~the perpendicular bisector of the~~ a perpendicular bisector of a section of a

line combining the ~~fore-mentioned~~ two intersections, the ~~fore-mentioned~~ two intersections and the radius of the ~~fore-mentioned~~ disc-like object.

2. (Currently Amended) ~~An automatic reference position teaching method of a disc-like object~~ The method for automatically teaching a reference position according to Claim 1, wherein the locus of the ~~fore-mentioned~~ detection means is a circular arc.

3. (Currently Amended) A method for automatically positioning a disc-like object with a known radius in ~~the reference~~ a reference co-ordinate system ~~including the~~ including a position of a handling device of the ~~fore-mentioned~~ disc-like object, ~~comprising~~ comprising:

a step of determining ~~the center~~ a center position of the ~~fore-mentioned~~ disc-like object in the ~~fore-mentioned~~ reference co-ordinate ~~system and~~ system; and

a step of calculating a transition quantity from ~~the center~~ a center position preliminarily taught to the ~~fore-mentioned~~ center position determined in the ~~fore-mentioned~~ reference co-ordinate system,

wherein the step of determining the center position of the ~~fore-mentioned~~ disc-like object ~~comprises~~ comprises:

a step of relatively moving a detection means against the ~~fore-mentioned~~ disc-like object and making one locus of the ~~fore-mentioned~~ detection means cross ~~against the~~ against a circumference of the ~~fore-mentioned~~ disc-like object,

a step of determining ~~the position~~ positions of two intersections by the ~~fore-mentioned~~ crossing in the ~~fore-mentioned~~ reference co-ordinate system, and

a step of calculating the ~~fore-mentioned~~ center position ~~using the~~ using a specific point on ~~the perpendicular bisector of the~~ a perpendicular bisector of a section of a line combining the ~~fore-mentioned~~ two intersections, the ~~fore-mentioned~~ two intersections and the radius of the ~~fore-mentioned~~ disc-like object.

4. (Currently Amended) A method for automatically positioning a disc-like object with a known ~~radius~~ radius, the disc-like object having one concave portion or one convex portion at one portion of ~~peripheral rim in the~~ a peripheral rim, in a reference co-ordinate system including ~~the position~~ a position of a handling device of the disc-like object, ~~comprising~~ comprising:

a step of determining ~~the center~~ a center position of the ~~fore-mentioned~~ disc-like object having ~~a concave portion or a~~ the concave portion or the convex portion in the ~~fore-mentioned~~ reference co-ordinate ~~system and~~ system, and

a step of calculating a transition quantity from ~~the center~~ a center position preliminarily taught to the ~~fore-mentioned~~ center position determined in the ~~fore-mentioned~~ reference co-ordinate system,

wherein the step of determining the center position of the ~~fore-mentioned~~ disc-like object having ~~a concave portion or a~~ the concave portion or the convex portion ~~comprises~~ comprises:

a step of relatively moving a detection means against the ~~fore-mentioned~~ disc-like object and making two loci of the ~~fore-mentioned~~ detection means cross ~~against the~~ against a peripheral rim of the ~~fore-mentioned~~ disc-like object,

a step of determining ~~the position~~ positions of two pairs of intersections consisting of two points of each of the ~~pairs~~ two pairs by crossing of the ~~fore-mentioned~~ two loci with the peripheral rim of the ~~fore-mentioned~~ disc-like object in the ~~fore-mentioned~~ reference co-ordinate system,

a step of calculating ~~the center~~ a center position of a circle when ~~those intersections are~~ one of the two pair of intersections is situated on a circumference including the ~~fore-mentioned~~ peripheral rim excluding the ~~fore-mentioned~~ concave portion or convex portion using ~~the specific point on the~~ a specific point on a perpendicular bisector of ~~the~~

~~section~~ a section of a line combining the ~~fore-mentioned two intersections, the fore-mentioned two intersections~~ two points of the one of the two pair of intersections, the two points of the one of the two pair of intersections and the radius of the ~~fore-mentioned~~ disc-like object, ~~with respect to the fore-mentioned two pairs, and~~ for each of the two pairs of intersections, and

a step of selecting the center position of the ~~fore-mentioned~~ disc-like object based on ~~the positional~~ a positional deviation direction of ~~the central~~ a central point when the ~~fore-mentioned~~ intersections are situated at the ~~fore-mentioned~~ concave portion or convex portion ~~comparing the fore-mentioned~~ by comparing the two center positions calculated.

5. (Currently Amended) ~~An automatic positioning method of a disc-like object~~ The method for automatically positioning the disc-like object according to Claim 3, wherein the locus of the ~~fore-mentioned~~ detection means is a circular arc.

6. (Currently Amended) An automatic carrying method of a disc-like object, comprising a step of carrying out the ~~automatic positioning method of~~ method for automatically positioning the disc-like object according to ~~Claim 3,~~ Claim 3, further including:

a step of correcting a carrying route preliminarily ~~taught of~~ taught to a holding portion of a carrying device as the ~~fore-mentioned~~ handling device based on a transition quantity which was calculated by the ~~fore-mentioned~~ positioning method, and

a step of carrying the ~~fore-mentioned~~ disc-like object to a fixed carrying position with the ~~fore-mentioned~~ holding portion of the ~~fore-mentioned~~ carrying device along the ~~fore-mentioned~~ carrying route corrected.

7-12. (Canceled)

13. (Currently Amended) A method for automatically positioning a disc-like object with an unknown ~~radius~~ radius, the disc-like object having one concave portion or one

convex portion at one portion of ~~peripheral rim~~ a peripheral rim, in the reference co-ordinate system including ~~the position~~ a position of a handling device of the disc-like object, ~~comprising~~ comprising:

a step of determining ~~the center~~ a center position of the ~~fore-mentioned~~ disc-like object having ~~a concave portion or a~~ the concave portion or the convex portion in the ~~fore-mentioned~~ reference co-ordinate ~~system and~~ system, and

a step of calculating a transition quantity from ~~the center~~ a center position preliminarily taught to the ~~fore-mentioned~~ center position determined in the ~~fore-mentioned~~ reference co-ordinate system,

wherein the step of determining the center position of the ~~fore-mentioned~~ disc-like object having ~~a concave portion or a~~ the concave portion or the convex portion ~~comprises~~ comprises:

a step of relatively moving a detection means against the ~~fore-mentioned~~ disc-like object, making three loci of the ~~fore-mentioned~~ detection means cross against the peripheral rim of the ~~fore-mentioned~~ disc-like object and determining the position of 3 pairs of intersections ~~consisting~~ each consisting of one pair of 2 points in the ~~fore-mentioned~~ reference co-ordinate system,

a step of selecting a common perpendicular bisector among 3 perpendicular bisectors with respect to the intersections of the ~~fore-mentioned~~ 3 pairs, and

a step of calculating the radius of the ~~fore-mentioned~~ disc-like object and the center position from ~~the specific~~ a specific point on the ~~fore-mentioned~~ common perpendicular bisector and 2 pairs of intersections with respect to the common perpendicular bisector.

14. (Currently Amended) ~~An automatic positioning method of~~ The method for automatically positioning a disc-like object according to Claim 13, wherein the ~~locus of the fore-mentioned~~ loci of the detection means ~~is a circular arc.~~ are circular arcs.

15-41. (Canceled)

42. (New) A device for automatically teaching a reference position which is a reference of a position of a disc-like object in a reference co-ordinate system including a position of a handling device of the disc-like object, comprising a control portion for executing the method according to Claim 1,

wherein the control portion includes a computer.

43. (New) A device for automatically teaching a reference position which is a reference of a position of a disc-like object in a reference co-ordinate system including a position of a handling device of the disc-like object, comprising a control portion for executing the method according to Claim 3,

wherein the control portion includes a computer.

44. (New) A device for automatically teaching a reference position which is a reference of a position of a disc-like object in a reference co-ordinate system including a position of a handling device of the disc-like object, comprising a control portion for executing the method according to Claim 4,

wherein the control portion includes a computer.

45. (New) A device for automatically teaching a reference position which is a reference of a position of a disc-like object in a reference co-ordinate system including a position of a handling device of the disc-like object, comprising a control portion for executing the method according to Claim 13,

wherein the control portion includes a computer.